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DIGITIZATION OF THE BATTLEFIELD: OPERATIONAL IMPLICATIONS FOR THE U.S. ARMY IN MULTINATIONAL OPERATIONS

A Monograph
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Abstract

DIGITIZATION OF THE BATTLEFIELD: OPERATIONAL IMPLICATIONS FOR THE U.S. ARMY IN MULTINATIONAL OPERATIONS. by MAJ Thomas D. Mayfield III, USA, 58 pages

International cooperation has become an increasingly important part of U.S. military operations world wide. TRADOC Pamphlet 525-5, Force XXI Operations, states as a goal that, "these operations be conducted under conditions where U.S. forces, supported by coalition partners, enjoy a qualitative technical, training, leadership, and most important information advantage." The U.S. Army's digitization of the battlefield will play a role in providing that information advantage. The central question this monograph will address is: How does the U.S. Army's digitization at the tactical level have an operational impact on future multinational operations?

Clearly, the U.S. Army's tactical level digital systems cannot solve all the problems associated with multinational operations. They have, however, demonstrated through the U.S. Army's experimentation process the potential to aid commanders in several areas. The relevant common picture provided through the MCS/P, ASAS, and the other supporting systems may have the potential to improve the multinational force commander's vision of the battlefield and to help him anticipate events on the battlefield. This paper addresses the operational impact the U.S. Army's digitization may have on the future multinational battlefield.

To answer the central question, the monograph will first consider the problems and principles associated with multinational operations using historical examples. The focus will be on the unique requirements of communications among multinational forces and the associated challenges. Next, the capabilities and limitations of the digital systems as they are being fielded in the U.S. Army will be analyzed, specifically identifying the potential benefits in multinational operations. Finally, the specific implications of U.S. Army digitization in future coalitions will be addressed and conclusions presented.

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Chapter I. Introduction

International cooperation has become an increasingly important part of U.S. military operations world wide. As the U.S. Army develops procedures and doctrine for future operations, the goal will be to maximize the effectiveness of these multinational operations. TRADOC Pamphlet 525-5, Force XXI Operations, states as a goal that, "these operations be conducted under conditions where U.S. forces, supported by coalition partners, enjoy a qualitative technical, training, leadership, and most important information advantage."[1] The U.S. Army's digitization of the battlefield will play a role in providing that information advantage. The central question this monograph will address is: How does the U.S. Army's digitization at the tactical level have an operational impact on future multinational operations?

Alliance or coalition warfare is intrinsically complicated and difficult. It involves numerous additional considerations foreign to most U.S. Army tactical units. These considerations will combine to make multinational operations difficult to plan and execute successfully. General Eisenhower noted the complexity of multinational operations when he said:

> ...(H)istory testifies to the ineptitude of coalitions in waging war. Allied failures have been so numerous and their inexcusable blunders so common that

> professional soldiers had long discounted the possibility of effective allied action unless the available resources were so great as to assure victory by inundation. Even Napoleon's reputation as a brilliant military leader suffered when students in staff college came to realize he always fought against coalitions - and therefore against divided counsels and diverse political, economic, and military interests. [2]

The National Security Strategy, however, states that "U.S. units will operate multinationally, whenever possible, to promote regional stability. Therefore, U.S. commanders should expect to respond to crises as part of a multinational force."[3]

According to Joint Publication 3-16, Joint Doctrine for Multinational Operations (First Draft),

> the basic challenge in multinational operations is the effective integration and employment of all assets provided toward the achievement of unity of effort despite disparate, and occasionally incompatible capabilities, equipment, and procedures.[4]

Likewise, U.S. Army, Field Manual (FM) 100-8, The Army in Multinational Operations (Draft) suggests all the principles of war found in U.S. doctrine apply to multinational operations. *Objective* and *Unity of Effort* are of particular importance. [5] The ability to effectively convey information is a key ingredient to achieving unity of effort in multinational operations.[6]

Through a series of experiments and exercises, the U.S. Army has demonstrated, the potential of digital information systems to improve the ability of its units to communicate

critical battlefield information.[7] The U.S. Army, in its Force XXI experimentation[8], has provided commanders with a suite of digital information systems. Each system primarily focuses on a specific battlefield operating system.[9] Together, these systems provide information to improve the situational awareness of the tactical unit and help give a relevant common picture of the battlefield. They focus on answering four basic questions for the commander, Where am I?, Where are my soldiers?, Where is the enemy?, What is each of them doing?.[10]

With the basic information provided through the relevant common picture, the commander can make more informed decisions about how and where to dispose his forces to accomplish his mission.[11] Admiral (Ret) William A. Owens, former vice-chairman of the Joint Chiefs of Staff, has concluded that, by providing a relevant common picture of the battlefield and improving the timeliness and accuracy of the information flow, digital systems will assist the commander in achieving unity of effort on the multinational battlefield.[12]

This paper will address the potential for the U.S. Army's digital information systems to aid the multinational force commander, specifically in terms of improvements in the command and control, and intelligence functions. Throughout the U.S. Army's experimentation, commanders have

noted particular benefits to be gained in these two operating systems through the use of digitization.[13] It will also identify areas of multinational operations where digital information systems are not likely to aid the commander in building unity of effort.

The applications of digital systems described in this paper, although in most cases tactical in nature, have operational level implications. FM 100-5 reminds us that "The intended purpose, not the level of command determines whether an army unit functions at the operational level."[14] Regardless of the size of a nation's military contribution to a coalition, its senior commander is effectively operating at the operational level, since he is responsible for representing his nation's interests.[15] It is for these reasons that the effects gained by digitization in coalition units, regardless of their level of command, have an operational level impact.

To answer the central question, the monograph will first consider the problems and principles associated with multinational operations using historical examples. The focus will be on the unique requirements of communications among multinational forces and the associated challenges. Next, the capabilities and limitations of the digital systems as they are being fielded in the U.S. Army will be analyzed, specifically identifying the potential benefits in

multinational operations. Finally, the specific implications of U.S. Army digitization in future coalitions will be addressed and conclusions presented.

Chapter II. The Challenges of Multinational Warfare.

"If I must make war I prefer it to be against a coalition"

Napoleon[16]

Napoleon recognized that coalition warfare was difficult and risky. The divergent aims, policies, and doctrines of the coalition partners make it difficult to achieve the synergistic effects needed to have complete success on the battlefield. Imperfect coalitions afforded Napoleon the opportunity to exploit the divergent aims of the enemy alliances to his benefit. Ironically, however, it was a coalition at Waterloo that ultimately succeeded in defeating him. The Duke of Wellington as the coalition leader with his Prussian partner, Field Marshal Gebhard Blucher, was able to overcome the challenges of multinational operations and achieve the unity of effort needed to win.[17]

For nations in the twentieth century, and beyond, coalition warfare will be the rule. "Unilateral action is the exception...In this century, excepting the Russo-Japanese and Iran-Iraq conflicts, all major interstate wars

have involved coalitions."[18] The political and fiscal environments in the modern world indicate that future large scale military operations will be multinational. Recent examples such as the Gulf War, and major peace and humanitarian operations in Somalia, Haiti, and the former Yugoslavia all involve coalitions. Recognizing this fact, the U.S. National Military Strategy states that

> While we maintain the unilateral capability to wage decisive campaigns to protect U.S. and multinational security interests, our Armed Forces will most often fight in concert with regional allies and friends, as coalitions can decisively increase combat power and lead to a more rapid and favorable outcome to the conflict.[19]

There are numerous examples throughout military history of operational defeats caused primarily by the failure of coalitions to achieve unity of effort. Napoleon's victories at Austerlitz, Friedland, and Wagram in 1805, 1807, and 1809, were largely the result of disruptive factors at all levels of command, in the coalitions facing him.[20] Over 130 years later, in France at the beginning of World War II, the inability of the French, British, Dutch, and Belgians to operate effectively together was a factor in initial German successes.

In order to maintain unity of effort and effectively command and control a force with multinational partners, the commander must be able to quickly and accurately convey information to his subordinates and supporting forces. The

sometimes divergent aims of the forces, the various languages involved, and the different military cultures combine to complicate the communications process. LTC John Welch, in his study of the feasibility of a NATO multinational corps states,

> No aspect of successfully joining combat [with a multinational force] is as important as the communication of the commander's intent and the processes that support it. Therefore, the architecture of command, control and communications systems is the basic glue which will hold a multinational [force] together.[21]

He goes on to say, communications provide the lifeline of command and control systems. Communications must be technically as well as tactically integrated into multinational forces.[22]

Integrating command, control and communications systems, however, is no small task. Some coalition partners may not posses compatible communications systems or they may not have them in sufficient numbers to be effective. During Operation Desert Storm, while operating with the French Sixth Light Armored Division, the XVIII Airborne Corps' major subordinate units each dispatched bilingual liaison teams equipped with U.S. radios to the French to enable vertical and lateral communications.[23] Even multinational forces who habitually operate together encounter the same problems. The NATO Allied Rapid Reaction Corps (ARRC), currently operating in the former Yugoslavia, has found that

it must exchange liaison teams with sufficient communications equipment to effect full coordination, since the organic systems of the assigned forces are not compatible and not sufficient for effective lateral coordination.[24]

The challenges of maintaining unity of effort while maneuvering forces of different nations towards an operational objective can be daunting. During the Gulf War, forces of different nations, with different equipment, maneuvered in close proximity of each other, narrowly escaping disaster on several occasions. The following vignette from the Gulf War demonstrates the difficulties of controlling multinational maneuver forces.

> The ground war was quickly gaining in momentum. The border was being breached on all fronts. In Joint Forces Command-North, the Egyptians were rapidly advancing after conducting a right turn towards Kuwait City. Communicating with them was becoming increasingly difficult. Concurrently, U.S. Marines were rapidly advancing north towards Ali As Salem Air Base in the vicinity of Kuwait City. Their rapid advance was astonishing. In the coalition war room it became apparent that the Egyptians and the Marines might soon meet and possibly not recognize each other. A meeting engagement was imminent.
>
> Recognizing this potential disaster, liaison officers in the coalition war room coordinated with the Saudi ground desk to communicate with the Egyptians to advise them of the Marines' rapid advance. Backup communication through the VII Corps Main Operations Center routed these same instructions to the Egyptians through corps liaison channels. Concurrently, the U.S. contingent in the coalition war room quickly alerted the Marines that the Egyptians were headed in their direction and to take heed. [25]

Fortunately, through effective liaison teams, and redundant communications systems, the necessary coordination was available to avoid a disaster which may have resulted in fratricide and the needless deaths of allied soldiers. An imperfect system of communicating between higher and adjacent forces, however, demonstrated the potential for the fog of battle to cause disastrous results for a coalition force.

Another key part of maintaining unity of effort in any force is the ability of the commander to convey a timely and accurate picture of the enemy situation to his subordinate forces. The threat holds a multinational force together. To help cement unity of effort, commanders of multinational forces must keep their units focused on the threat[26]. The staff must share appropriate intelligence with the coalition partners whenever possible.[27] In the past, sharing intelligence information with multinational partners has been difficult. Aside from the political problems of sharing intelligence with coalition partners, the technical and organizational problems are significant as well. Writing in the July 1991 issue of Military Review, LTG Frederick Franks, commander of the U.S. VII Corps stated:

> Even simple differences in threat data bases, communications, and analysis doctrine can disrupt the continuity of the threat picture between adjacent units and from higher headquarters to subordinate headquarters and back.[28]

General Franks was citing his experience from REFORGER '90 in which VII Corps had to overcome major challenges in sharing intelligence with units from other NATO countries.

During the Gulf War, the technical communications links for the transmission of intelligence to some of the coalition partners were almost nonexistent. For example, during the Gulf War, the U.S. 3rd Army liaison team hand-carried hard-copies of intelligence reports and imagery to the Egyptian corps commander.[29] The Egyptians received the intelligence on the Iraqi defensive positions only a few days prior to the start of the ground offensive, long after the maneuver plans for the attack had been completed.

Finally, following Operation Restore Hope, in Somalia, in his after action review (AAR), the G2 of the 10th Mountain Division had the following observation about sharing intelligence with coalition forces,

> Information exchange became a problem due to the lack of communications compatibility. Coalition forces either did not have a data transfer capability, or what they had was not compatible with U.S. equipment. Units were forced to tie up the operations net with voice traffic to receive all intelligence information.[30]

All three of these examples note the difficulty of sharing intelligence with coalition partners, resulting primarily from a lack of communications interoperability and disparate levels of technical sophistication of the allies. The ability to ensure that all the forces in a coalition

have the information they need to support planning and execution is very difficult, but vital to maintaining unity of effort within a coalition.

Recognizing the difficulties of coalition operations, the U.S. is developing long overdue doctrine for the employment of forces in multinational operations. In 1976, after the close of the U.S. involvement in the Vietnam War, R.W. Komer produced a RAND study entitled *Needed: Preparation for Coalition War.* In it Komer noted,

> ...(D)espite all this wartime experience [in multinational operations], we never spent much effort in peacetime preparing explicitly for coalition warfare again next time around. Instead our services retreated into their institutional shells and postured as though we and the enemy would be the only ones on the battlefield. No doctrine ever emerged. Rather, in each succeeding conflict we developed an ad hoc response after the war started.[31]

Twenty years after Komer's study, Joint Publication 3-16, Joint Doctrine for Multinational Operations, and U.S. Army Field Manual 100-8, The Army in Multinational Operations are both in draft. They are taking on the difficult task of attempting to outline the doctrine and procedures for the conduct of multinational operations across the spectrum of conflict. This is no easy task since there are many, and sometimes contradictory, sets of principles and tenets.

The difficulties arise in developing doctrine for multinational operations because they are not simply a

logical extension of normal operations. There are numerous areas which the operational and tactical commander must consider when planning multinational operations. Multinational operations have no single, all encompassing doctrine in the manner FM 100-5 provides doctrine for U.S. forces. Each situation and combination of forces is unique.[32] In the article *The Challenges of Combined Operations*, Major General Waldo Freeman (et. al) calls these areas of consideration *Operational-Level Realities*. He says there are nine areas in which operational level problems are bound to arise. The areas are, Goals, Doctrine, Intelligence, Language, Training, Equipment, Logistics, Cultures, and Sensitivities.[33] These realities represent the fundamental differences in the way different cultures think, communicate, train, and operate. Coping with these differences is the real challenge of multinational operations.[34]

To overcome these differences, the multinational force commander strives towards interoperability between the forces of the coalition. Brigadier General William Mullen and Lieutenant Colonel George Higgins, writing in Military Review, identify communications as one of the most important factors in gaining interoperability.[35]

The issue of different languages only serves to exacerbate the problem of multinational communications. Retired U.S. Army General Robert Riscassi noted,

> It's difficult to sustain a rapid decision cycle in combined operations...even the most common tasks such as sharing intelligence, must await translation before data can be passed through the command. This in turn slows the development of a plan, which, in turn, slows the other elements of the decision cycle.[36]

The use of special operations forces and linguists may help overcome the language problems. These personnel, however, are often in short supply or may lack the tactical expertise and depth of understanding to cross both language and doctrinal boundaries to be fully understood.[37]

The challenges of different languages, cultures, national interests, and levels of technology create significant obstacles for commanders in multinational operations. This chapter has identified effective communications as one of the keys to overcoming some of these obstacles and achieving interoperability within a coalition. Communication of the commander's intent and the ability to provide a common picture of the friendly and enemy situation, will aid the commander in achieving and maintaining unity of effort within the coalition. The U.S. Army, in its effort to digitize the battlefield, is focusing much of its emphasis on developing digital information systems which enable commanders to provide information to

subordinate units. These systems will be described in the following chapter. Digitization has the potential to assist the multinational force commander to communicate effectively within his coalition.

Chapter III. U.S. Army Digitization

It is important to understand the current capabilities of the U.S. Army when discussing the implications of digitization on multinational operations. The U.S. Army is leading the world in the development of tactical and operational level digital information systems. As part of its Force XXI initiatives, the U.S. Army has experimented with the use of numerous types of digital information systems and tested their applicability to combat operations.[38] There are ongoing efforts in the U.S. Army to develop detailed techniques and procedures for their use on the battlefield as well. Other nations, specifically Germany, France, and to a lesser extent Britain, are also developing digital command and control systems.[39] The capabilities of these systems, while generally not as mature as the U.S. systems, are similar in their focus.

The U.S. Army's Digitization Master plan defines digitization as follows:

> Digitizing the battlefield is the application of technologies to acquire, exchange, and employ timely

> digital information throughout the battlespace, tailored to the needs of each decider (commander), shooter, and supporter. Digitization allows each soldier to maintain a clear and accurate vision of the common battlespace necessary to support planning and execution.[40]

Digitization provides the commander and his staff a digital information network that aids in the planning and execution of tactical operations. The goal of the digitization effort is to create a relevant common picture of the battlefield from soldier to commander at each echelon.[42] The relevant common picture is based on data collected through the network of sensors, command posts, processors, and weapons

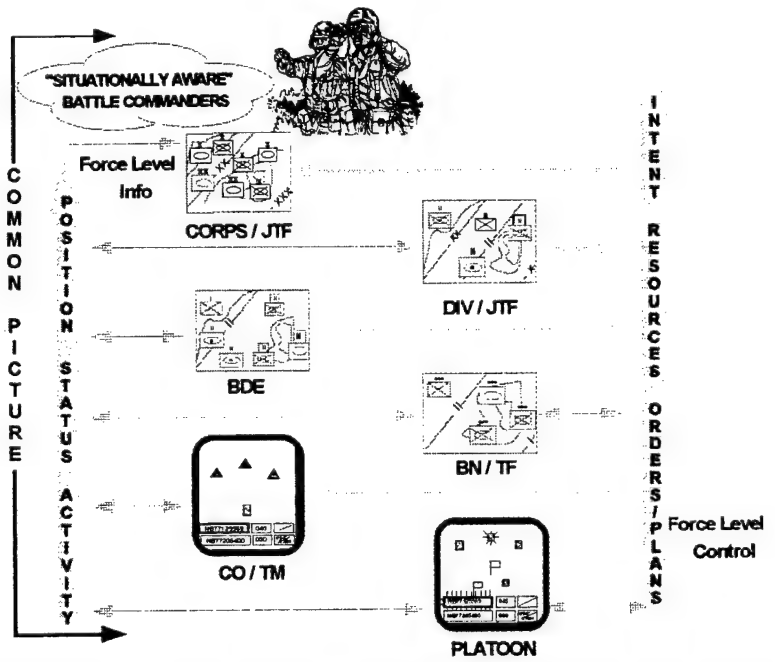


Figure 1. Relevant Common Picture for Battle Commanders[41]

platforms. This allows participants to aggregate relevant information and maintain an awareness of what is happening

in the theater battlespace, both friendly and enemy forces.[43] Figure One depicts the relationship of the relevant common picture at the various levels of command from platoon through Corps/JTF levels.

In their book, Envisioning Future Warfare, General Gordon R. Sullivan and Colonel James M. Dubik stated:

> Shared situational awareness, coupled with the ability to conduct continuous operations, will allow information age armies to observe, decide, and act faster, more correctly, and more precisely than their enemies. [44]

General Sullivan and Colonel Dubik predicted that shared situational awareness will enhance the operations of information age armies. The Army Digitization Master Plan (ADMP) states,

> The objective of the Army digitization effort is to assure the superiority of our command and control systems by providing our warfighters with a horizontally and vertically integrated digital information network.[45]

The central purpose of the digitization effort is to allow each soldier to maintain a clear and accurate vision of the common battle space necessary to support planning and execution.[46]

Throughout the U.S. Army's Advanced Warfighting Experiments (AWEs), commanders have noted the enhanced situational awareness provided by the relevant common picture, has improved their ability to command and control forces and synchronize operations. For example, following

Advanced Warfighting Experiment (AWE) Focused Dispatch, (a brigade level exercise held in 1995) a task force commander noted the following in his after action review,

> "The situational awareness information overlayed against the operational graphics lets the commander know if forces are arrayed in accordance to his intent. He then compares this against the enemy situation...and adjusts plan to meet [the] situation on the ground"[47]

He further noted that the improved situational awareness allows the commander and operations officer to assess synchronization across the battlefield operating systems.[48] The relevant common picture provided to that commander enabled him to better ensure unity of effort within his unit.

Another example of the benefits of the relevant common picture was noted during Prairie Warrior '95. Prairie Warrior '95 was a simulation-based AWE designed to test and validate conceptual doctrine, training, organizations, equipment, and technologies.[49] The initial report following the exercise made the following observation regarding the utility of the relevant common picture,

> The MSF Heavy Brigade demonstrated a significant enhancement in its ability to assess the current situation by the employment of digital C2 systems. The ability to establish a database of information pertaining to friendly force dispositions, terrain and weather effects, and enemy locations and activities provided the commander and staff a basis for sound decision making throughout the campaign. These enhancements translated into better time management, rapid response to changing battlefield conditions, and better use of contingency and option planning.[50]

As noted in the example above, by using the relevant common picture provided through the digital command and control system, the unit had a clearer picture of the units on the battlefield, both friendly and enemy, than it would have otherwise been able to have. This information helped the commander to assess the situations as they were presented to him and make decisions more quickly. The capability of its subordinate units to quickly and correctly assess the situation on the battlefield, enabled the higher headquarters to better synchronize operations and maintain unity of effort throughout the organization.[51]

The improved situational awareness noted in the previous examples was made possible by the information provided through the combination of several digital information systems. Those systems are found in the Army Battle Command System (ABCS). The following paragraphs provide a brief description of the systems that will be available to the U.S. Army commander for use in future multinational operations.

The ABCS is the collection of digital systems that will provide enhanced digital information capabilities to the U.S. Army at the strategic, operational and tactical levels. The Army Tactical Command and Control System (ATCCS), although tactical in name, is the subset of ABCS that spans

the linkages between the command and control systems of the operational and tactical levels of war.[52] Portions of the ATCCS systems are fielded from battalion to echelons above corps level. ATCCS is a system, comprised of five subsystems, each providing a unique contribution to the overall information picture for the operational and tactical commanders. Together these systems provide the relevant common picture for the commander.

The central system around which the ATCCS is built is the Maneuver Control System/Phoenix (MCS/P). Figure Two depicts the central role of the MCS/P and the interface of the

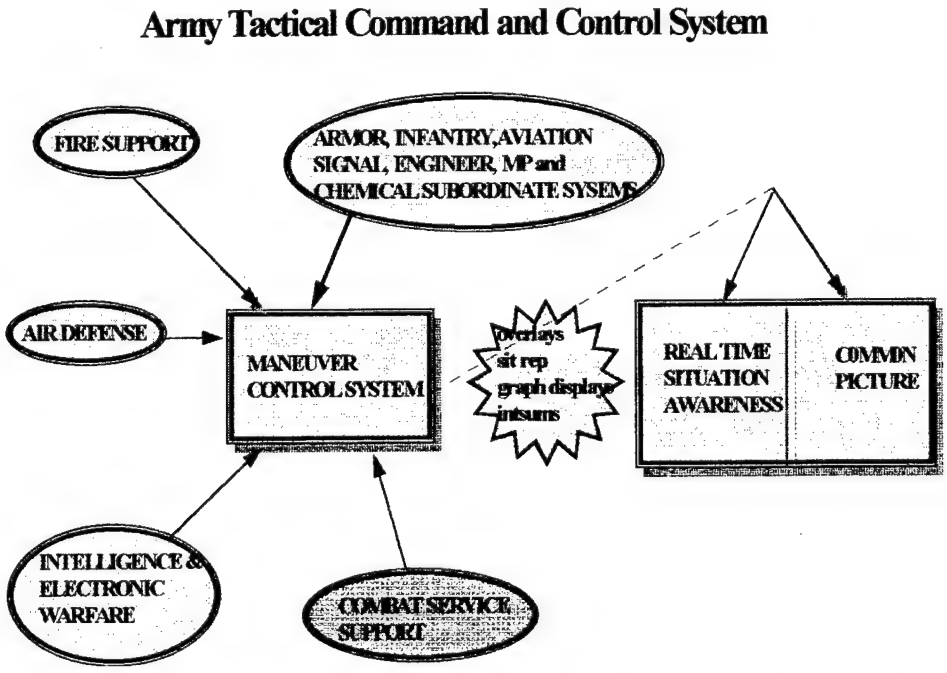


Figure 2. The Army Tactical Command and Control System (ATCCS).[53]

supporting systems. MCS/P is an improved version of the Maneuver Control System (MCS) fielded by the U.S. Army in

the 1980s. The MCS/P is a mobile digital system that will enable commanders and staffs to distribute information on the battlefield, and provide access to graphically depicted friendly unit locations, intelligence, and friendly unit reports.[54] Appendix A contains a sample of a MCS/P tactical display screen. The map and graphics capability provide the user with a rapid and easily understandable means of conveying information to subordinate units. During the Army's experiments, users have often noted that the digital graphics are more concise and simpler to understand than conventional graphics.[55]

Additionally, through the MCS/P the commander can transmit critical battlefield information such as mission, courses of action, warning orders, operations orders, intelligence information, fire support information, supply status, or any other relevant combat information to subordinate units in theater.[56] He has the ability to do this quickly and accurately in a manner the enemy has little or no ability to jam or intercept.

The All Source Analysis System (ASAS), the second component of ATCCS, is a ground based, mobile, automated intelligence processing and dissemination system.[57] It provides intelligence support from theater to battalion level. The Intelligence and Electronic Warfare (IEW) component of the ATCCS system provides all source

intelligence fusion to commanders and staffs to gain a timely picture of enemy deployments, capabilities, and potential courses of action.[58] ASAS receives inputs from all levels, from national intelligence collection assets such as satellite imagery, to ground reconnaissance units deployed in a security zone, and combines them to provide a common picture of the enemy situation. With direct digital links to the MCS/P system, ASAS provides enemy data into the commander's relevant common picture. A sample ASAS display is included in Appendix B.[59] This particular sample depicts not only confirmed enemy unit locations, but templated locations as well. Analysts operating from a central collection and analysis site, called the Analysis and Control Element (ACE), can review the available intelligence information and tailor it to the needs of the commander on the ground. In this case, the analysts have depicted several templated enemy units about which the commander was particularly concerned, namely the Regimental Artillery Group (RAG) and the reserve. Commanders at all levels can draw from the ASAS information data base to support their planning processes.

ASAS has demonstrated the ability throughout the AWEs to provide large amounts of intelligence information.[60] Provided the receiving unit has the procedures to process and integrate the large amounts of intelligence information,

ASAS can significantly enhance the commander's vision of the battlefield, enabling him to make better informed decisions.[61] One problem noted by users, however, is that in some cases, ASAS provides too much information for the user to process. The result is the user becomes overwhelmed, decreasing his ability to synthesize the data into a useful enemy situation for the commander.[62] The lesson learned from experience is that ASAS must be employed with clear doctrine and procedures to establish responsibilities for analyzing and synthesizing data into useable and manageable forms.[63]

The Advanced Field Artillery Tactical Data System (AFATDS) is the third component of ATCCS. While primarily a tactical level system for managing fire support assets, AFATDS can provide the operational level commander the ability to centrally plan and coordinate fires in the theater. By providing the capability to digitally transmit fire support information, it aids in coordinating and optimizing the use of all fire support assets, including field artillery, missiles, attack helicopters, air support, and naval gunfire.[64]

The fourth component of ATCCS is the Forward Area Air Defense Command Control and Intelligence System (FAADC2I). FAADC2I is an integrated system of weapons, sensors, and command and control for targeting and providing information

to air defense weapon systems at the corps level and below.[65] Although primarily a U.S. Army system, it delivers information throughout the theater for air defense protection. It provides a capability, through digital means, to acquire, process, and distribute information necessary for the planning and coordination of air and missile defense in coordination with the joint and allied forces in theater.[66]

The final component of the ATCCS system is the Combat Service Support Control System (CSSCS). CSSCS will enable logisticians to consolidate and collate vast quantities of data required to integrate situational awareness within the CSS mission area.[67] By providing a digital transmission capability to the logisticians, it will provide the ability to track and manage critical information on all classes of supply, transportation, medical, and other essential services. It can be linked to the strategic level CSS systems to give commanders from theater down to battalion levels a common picture of the logistical situation.

Based on the previous descriptions, what is the value added for the commander who has the capabilities found in the ATCCS? Digital systems, such as MCS/P and ASAS can provide the commander, his staff, and subordinate commanders a common understanding of the battlefield. Commanders will have the ability to receive and evaluate battlefield

information, such as friendly and enemy unit locations and dispositions, combat power information, and information about combat multipliers, such as logistics. Through shared data bases, the staffs at each level will have access to common planning data, such as terrain data, weather data, and information on enemy preparedness and obstacles in zone. The digital systems will also allow the commander to disseminate decisions and orders rapidly to the staff and subordinates for execution in a digital burst transmission that the enemy will have little or no ability to jam or intercept. Commanders and staffs will have the ability to create and send multiple warning orders and FRAGOs with overlays and text to make sure their subordinate units have the very latest planning information available. With these capabilities, commanders and staffs of digitally equipped units will be able to improve the efficiency and effectiveness of the planning process as well as command and control in the execution phase.[68]

Without doctrine for the application of these technologies to solve the problems associated with multinational warfare, the digital information systems will be of little use to the coalition commander. This chapter has noted that digital systems have demonstrated potential to assist commanders, particularly in the combat functions of command and control and intelligence operations. The

challenge then is to determine what portions of digitization, as demonstrated in the U.S. Army, have applicability in multinational operations. Given the constraints and limitations of operating with multinational forces, some of the capabilities may provide tremendous benefit, while others may be a hindrance to effective communications. The following chapter will address the potential application of the U.S. Army's digital technology to help the multinational force commander more efficiently and effectively manage combat functions and achieve the unity of effort that is key in multinational operations.

Chapter IV. The Use of Digital Information Systems in Multinational Operations

Granting the same aggregate of force, it is never as great in two hands as in one, because it is not perfectly concentrated.

RADM A.T. Mahan,
Naval Strategy, 1911[69]

Admiral Mahan recognized the value of achieving unity of effort, a problem that is particularly vexing in multinational operations. Joseph S. Nye and Admiral (Ret) William A. Owens noted in their article "America's Information Edge" that America's information advantage can help the multinational force commander accomplish this task.

They posit that a revolution in military affairs is at hand resulting from the emerging information technologies. The core of the capabilities provided in this revolution in military affairs is the ability to provide dominant situational knowledge. They go on to say this capability is "fungible and divisible,"[70] meaning the U.S. can share the capability with whomever it wants without diminishing its value.

In order to ensure the U.S. and its allies maintain information dominance on the multinational battlefield, the U.S. must assume the lead role in establishing interoperability of forces in the information age. Since World War II, the U.S. has been the dominant partner in every coalition conflict in which it has engaged.[71] Nye and Owens note that, "the one country that can best lead the information revolution will be more powerful than any other. For the foreseeable future, that country is the U.S.."[72] In recent years the U.S. has spent large amounts of resources on improving its ability in intelligence collection, surveillance, and reconnaissance (ISR), command, control, communications, and computer processing (C4I), and precision force, (the ability to use deadly violence with greater speed, range, and precision). The U.S. has done this, according to Nye and Owens, while most other nations have

not yet realized a revolution in military affairs was going on.[73]

For these reasons, the U.S. will be viewed as the natural leader for future coalitions, "not just because it happens to be the strongest, but because it can provide the most important input for good decisions and effective action for other coalition members."[74] In future multinational military operations, the U.S. military will be compelled to provide the "information umbrella"[75] for the coalition forces, much like it provided the nuclear umbrella for the western forces during the bulk of the Cold War. The U.S. must provide this simply because it is the only nation that is able to do so. This umbrella, provided by the U.S. military to the forces of the coalition, is the mechanism that will help the U.S. as the leader, achieve the unity of effort required to succeed in multinational operations.

The U.S. Army cannot expect forces of other nations to develop or purchase compatible digital systems. Most nations simply do not have the money to purchase such systems. Those who do, for example, France, Germany, and Britain, are for the most part following development paths that further their own national agendas.[76] U.S. military combat developers negotiating with the western European allies about the future of digital systems on the NATO battlefield are time and again frustrated by the

unwillingness and inability of the NATO partners to design their systems to be compatible with the existing U.S. systems.[77] The U.S. must, therefore, be prepared to provide the digital information capabilities for all nations in any future multinational military operation, or at the least the technical interface that make the various systems on the battlefield compatible.

But how does the U.S. share this capability with its coalition partners, particularly in the command and control and intelligence operating systems? How can the U.S. Army maintain its level of information dominance when operating in a coalition with partners who may be operating with industrial age or even agrarian age levels of technology? These are questions that the U.S. Army must address as it deploys digital information systems on the battlefield. Developing internal mechanisms and procedures for the use of digital technology is important, but without procedures for using the systems in conjunction with multinational partners, the utility of the information will be limited in most future operations.

Current U.S. Army doctrine for multinational operations suggests several methods for interface between U.S. and coalition units.[78] Two of these that may be useful when sharing digital information with multinational partners are liaison teams and coordination centers. Neither of these

organizations are new to the U.S. Army. But, by augmenting them with the digital systems described earlier, the U.S. commander can provide the advantages of the relevant common picture to the multinational partners within a future coalition.

Liaison teams come in many shapes and sizes. Their make-up is normally determined by the commanders based on the mission and the circumstances surrounding the operation.[79] Regardless of their size and composition, the role of the liaison team is to help the commander ensure mutual understanding and unity of purpose and action.[80] By integrating MCS/P, ASAS, and the other supporting digital systems into the liaison teams, the U.S. Army commander will be able to provide enhanced situational awareness to the coalition commander through his liaison team.

Figure Three depicts a hypothetical coalition in which U.S. Corps and Division headquarters have dispatched digitally equipped liaison teams to coalition headquarters. Each team will be able to provide near real-time friendly

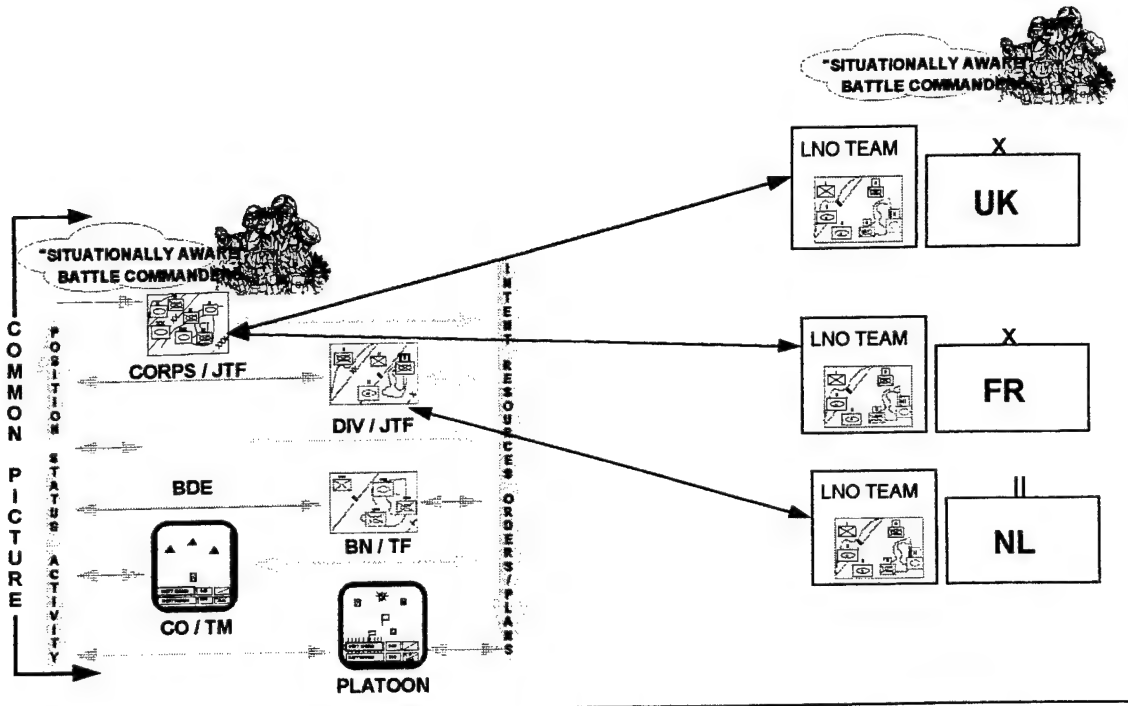


Figure 3. Digitally Equipped Liaison Teams

and enemy unit locations and dispositions to the commander of the coalition unit. The U.S. commander will be able to rapidly pass intelligence to the coalition unit through the ASAS to ensure they have a common picture of the enemy situation. By gaining access to AFATDS, the liaison teams will be able to provide information to both the U.S. and the coalition force to aid in the synchronization of fires. Likewise, through the FAADC2I they will be able to enhance

the synchronization between the air defense planners of the two forces. Information provided to the liaison team through the CSSCS will be available as well to aid the forces in coordinating logistical operations.

Coordination centers represent a second option for providing coalition forces access to the U.S. Army's digital information. A coordination center is simply a place where representatives of multinational forces can coordinate actions, exchange information, and work mutual support issues.[81] Coordination centers may be established when no real coalition command structure exists, yet when there is a need to coordinate actions between the forces of different nations.[82] During the Gulf War, the Coalition, Coordination, Communications, and Integration Center (C3IC) was established to make unity of effort among the coalition members possible when unity of command had not been established.[83]

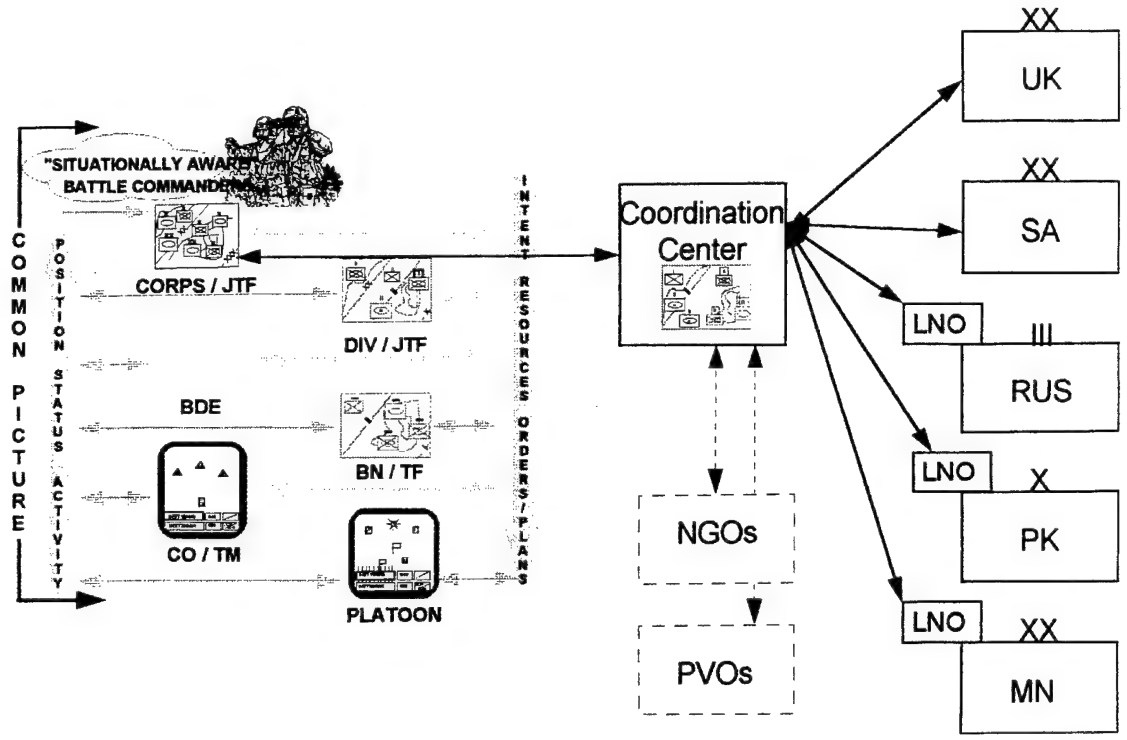


Figure 4. Digitally Equipped Coalition Coordination Center

Figure Four depicts a hypothetical coalition in which a coordination center has been established. By giving the coordination center access to the U.S. Army's digital information systems, a broad range of coalition partners will be able to share in its benefits. While this technique does not deliver the information directly to the headquarters of the coalition forces, it does give them some access to the information. This technique may provide the U.S. commander a lower cost option than dispatching liaison teams with digital systems to each coalition force headquarters.

There are many different ways coalition forces could interface with the coordination center. Some may do so through liaison teams, others directly. Non-governmental organizations (NGOs) and private volunteer organizations (PVOs) may have access to the coordination center as well. There are endless combinations of methods by which coalition forces might gain access to the digital information. The exact techniques and procedures will be dictated by the U.S. commander based on the situation.

Liaison teams and coordination centers are by no means the only methods of interfacing with multinational partners. Depending on the unique make-up of a coalition, a combination of methods may be used to share information and synchronize operations. Liaison teams and coordination centers do, however, provide a doctrinal infrastructure from which the U.S. commander can share digital information with his coalition partners. Given the techniques described for providing coalition forces access to the U.S. Army's tactical level digital information systems, what is the operational impact?

Operational Impact.

FM 100-5 notes that "in its simplest expression, operational art determines when, where, and for what purpose major forces will fight."[84] Nye and Owens posit that

sharing the U.S.'s dominant situational knowledge with coalition partners will empower them to make better decisions, and should they decide to fight, they could achieve the same kind of military dominance as the U.S..[85] They go on to say that accurate real-time situational knowledge is key to reaching agreement within coalitions on what to do and is essential to the effective use of military forces.[86] In essence, the U.S.'s information technology will aid the multinational commander in addressing the issues of operational art.

Specifically, the U.S. Army's digital information systems, including MCS/P, ASAS, and the other supporting systems, can rapidly provide a coalition force headquarters large amounts of critical information. This will enable them to make better tactical decisions in support of the operational plan. Digital images portray the friendly and enemy situation more clearly and accurately than verbal or text messages can. As noted in chapter three, U.S. units have found that digital maps and graphics are more concise and simpler to understand than manual versions.[87]

Reviewing the MCS and ASAS images in Appendices A and B, the obvious benefits are that a large amount of information can be conveyed in a single picture. For example, the ASAS picture in Appendix B portrays dozens of pieces of information to the receiver. They include enemy

vehicle locations, obstacles, reserves, artillery units, and battle positions. The more trained observer may be able to deduce the locations of engagement areas, main efforts, and counterattack routes. Additionally, pictures may mitigate, to some degree, the language barrier. Although they certainly do not eliminate the requirement to speak a common language, digital pictures may make it easier to convey information with reduced risk of misunderstanding.

The speed at which the U.S. commander can convey critical battlefield information is improved using digital systems as well. During the Gulf War, the means of sharing detailed images of the battlefield with a coalition force headquarters was in some cases by courier via air or ground transportation.[88] The liaison team working with the Egyptian corps during the Gulf War routinely traveled 60 kilometers or more to pick-up imagery and graphics. In some cases, they had to travel by air to the CENTCOM headquarters in Riyadh to collect information and guidance, a round trip of eight hours.[89]

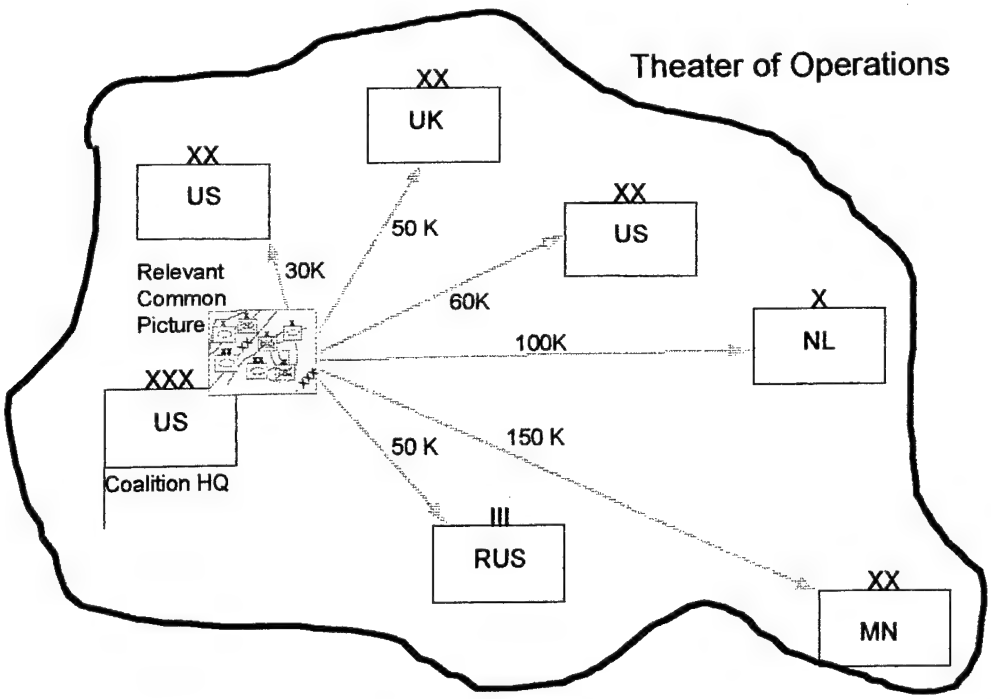


Figure 5. Multinational Theater of Operations

Consider the hypothetical theater of operations in Figure Five. In a dispersed theater of operations, where manual methods of delivering imagery and graphics are used, liaison officers traveling by ground at fifty kilometers per hour could take three hours or more to reach the most distant unit. By helicopter, the same liaison officer could deliver the information in roughly an hour. By using digital transmission, trough ASAS and MCS/P, and satellite communications technology, the same images could be delivered in a matter of minutes. In some cases, the situation may not require speed of transmission, but in other situations it may make the difference between success

and failure of an operation. When time is critical to an operation, the U.S. Army's digital systems can provide the operational commander a means of quickly conveying information to his coalition partners.

The situational knowledge provided through the relevant common picture will allow the coalition force to reduce the potential of fratricide. In the example used in chapter two, during the Gulf War, Egyptian forces and a U.S. Marine Corps unit narrowly escaped inadvertently meeting on the battlefield. Had the two forces collided, the Egyptians, using equipment similar to the Iraqis, might have been mistakenly identified as enemy by the USMC gunners and fired upon.

The MCS/P picture of the battlefield is regularly updated with the most current unit locations. It can provide the multinational forces a better awareness of the location and activity of friendly flank units. If equipped with MCS/P, forces will be able to avoid inadvertent meetings on the battlefield. In the Egyptian case, the liaison team would have noted the location of the USMC force on the MCS/P display and alerted the Egyptian commander. The MCS display in Appendix A can provide an example of the clarity with which an observer can see the locations of friendly units. The relevant common picture cannot preclude all cases of fratricide. It will, however, serve as an aid

to the commander to reduce chance meetings of multinational forces on the future battlefield.

To enhance unity of effort, the operational level multinational force commander must keep his units focused on the threat and agreed upon responses to the threat.[90] The threat holds a multinational force together. ASAS has the capability to provide an accurate, common picture of the threat, upon which all members of a coalition can focus. American intelligence collection systems can provide far more information than most coalition partners would normally expect to have. Positioning ASAS with liaison teams or coordination centers will also ease the technical interoperability problems so common in past multinational operations. The ability to rapidly pass intelligence updates and new information will allow the U.S. commander to keep the multinational partners focused on the most current enemy situation. This will aid the commander in ensuring all forces are focused on a common objective.

Finally, digital information systems will aid the multinational force commander in synchronizing support operations. The MCS/P with its direct interface with AFATDS, FAADC2I, and CSSCS will allow planners to more efficiently work support issues within the coalition. Fire support planners, working through liaison teams or coordination centers, can enhance the synchronization of

tactical and operational fires and air support. Air defense planners can work to ensure unity of effort within the theater air and missile defense plans. Logisticians can exchange information digitally between forces to solve support issues and keep the commander informed of the logistical status of the forces in the coalition. All this can be done with the benefits of speed and accuracy unique to digital communications. MCS/P will not negate the need for face to face coordination between planners to resolve support issues. It may, however, reduce the need for time-consuming travel and coordination and enhance the level of cooperation among coalition partners.

Operational Issues Digitization Cannot Address

Digitization will provide some unique advantages to the multinational force commander at the operational level. There are, however, a number of challenges in multinational operations which digitization does little to overcome.

The U.S. Army's digital systems may have the potential to aid the commander in gaining and maintaining unity of effort, but they will have little effect on the national goals and objectives that determine the actions of a nation's forces. Unity of command issues will not be resolved through the use of the U.S. Army's digitization. Issues relating to classified intelligence collection

capabilities remain problematic. For example, U.S. intelligence operators are often reluctant to share certain information with multinational partners for fear of compromising a collection capability. Nye and Owens suggest that the U.S. should be more open and generous with its intelligence collection capability, in an effort to more fully share America's information advantage with its coalition partners.[91] That issue presents some interesting issues, and deserves further study, but it is beyond the scope of this paper.

Military doctrine and training differ among the nations of a coalition. Even nations speaking the same language, such as the U.S. and Britain, use different terms to describe military actions and events. Digitization will do little to solve this problem. Astute liaison officers are still critical to translating American plans into something useful for a coalition force.

Military equipment, particularly communications equipment, varies from nation to nation. By using the techniques described in this paper, digitization will do nothing to resolve that issue. Without further multinational agreements on the specifications of future digital equipment, interoperability may even be made worse as the U.S. Army develops and fields new digital systems.

Cultural differences will always exist among nations. Digitization will be a foreign concept to many future coalition partners. Members of the ARRC planning staff note that cultural differences make command and control relationships tenuous in a multinational force.[92] Some nations may resist the introduction of high-tech U.S. equipment into their headquarters. Cultural differences will only be overcome by experience and perseverance. The U.S. Army's digital information systems will provide neither.

Language differences, while possibly mitigated to some degree by the use of digital pictures, will still remain a major obstacle to communications in multinational operations. Liaison officers trained in the languages and cultures of the coalition partners will always be critical for communicating among forces in a coalition. As General (Ret) Riscassi noted, the translation of plans from one language to another is a critical but time consuming step that planners must account for.[93]

Finally, trust and confidence remain key factors in the success of a multinational operation. The relevant common picture provided by the U.S. Army's digital systems may be beneficial to the commander of a coalition force, but instilling a common purpose and goal in the forces of a coalition remains a command issue. Coalition warfare

demands the efforts of leaders capable of inspiring, motivating, and leading a multinational force in execution.

Chapter V. Conclusion

FM 100-5 notes that operational art requires broad vision and the ability to anticipate.[94] Clearly, the U.S. Army's tactical level digital systems cannot solve all the problems associated with multinational operations. They have, however, demonstrated through the U.S. Army's experimentation process the potential to aid commanders in several areas. Of particular note are the benefits commanders can gain in command and control and intelligence. The relevant common picture provided through the MCS/P, ASAS, and the other supporting systems may have the potential to improve the multinational force commander's vision of the battlefield and to help him anticipate events on the battlefield.

Analysis of the evidence leads to several general conclusions. The first is that the U.S. will, for the foreseeable future, have to assume the lead role in information operations in all coalitions in which it participates. This will result in the U.S. remaining the dominant partner in every coalition, most likely providing the command apparatus for the coalition as well. The reason for this is that no other nation has the capability or the

resources to effectively provide the information systems necessary to perform the task. The intelligence systems, terrain and weather systems, the information transfer platforms, and the procedures to integrate them, all primarily belong to the U.S.. Some of the NATO nations have digital systems, but with much less capability and they are years behind in their development. In most cases, the U.S. will have to provide virtually all the capability for its coalition partners.

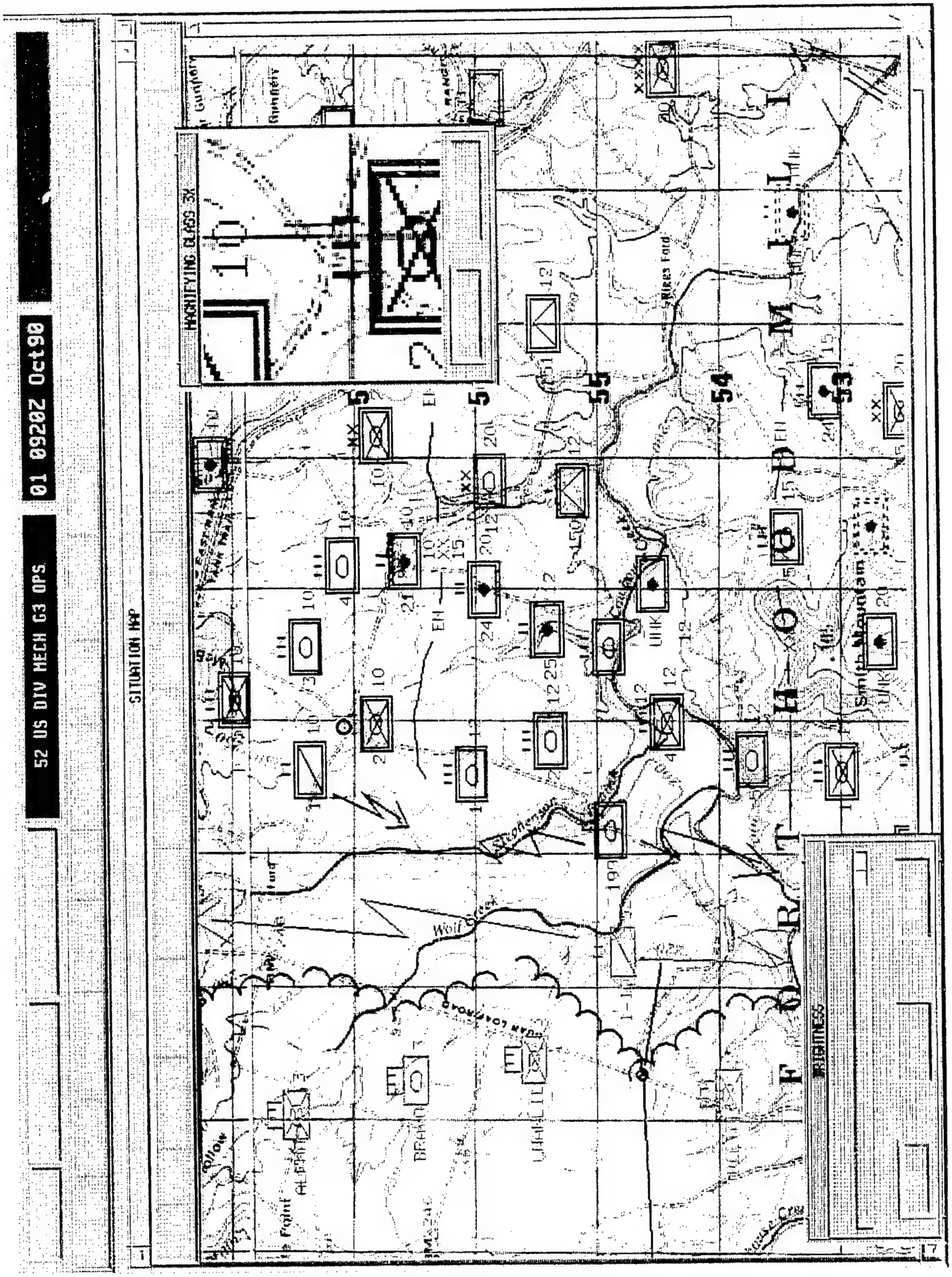
The second conclusion is that information operations will expand the role of liaison teams to be not only a conduit for information, but in some cases the primary source of information for the commander of the foreign unit. If the U.S. is to maintain the information dominance as stated in its doctrine, the liaison teams working with the coalition forces and the coordination cells, like the Gulf War's C3IC, will have to be trained and equipped to provide the information functions for the U.S.'s coalition partners. These teams will be an even more critical link between the multinational force commander and the coalition forces than ever before.

The operational impact is that by sharing access to the relevant common picture with its coalition partners, the U.S. will be better able to synchronize coalition operations and maintain unity of effort towards a common objective.

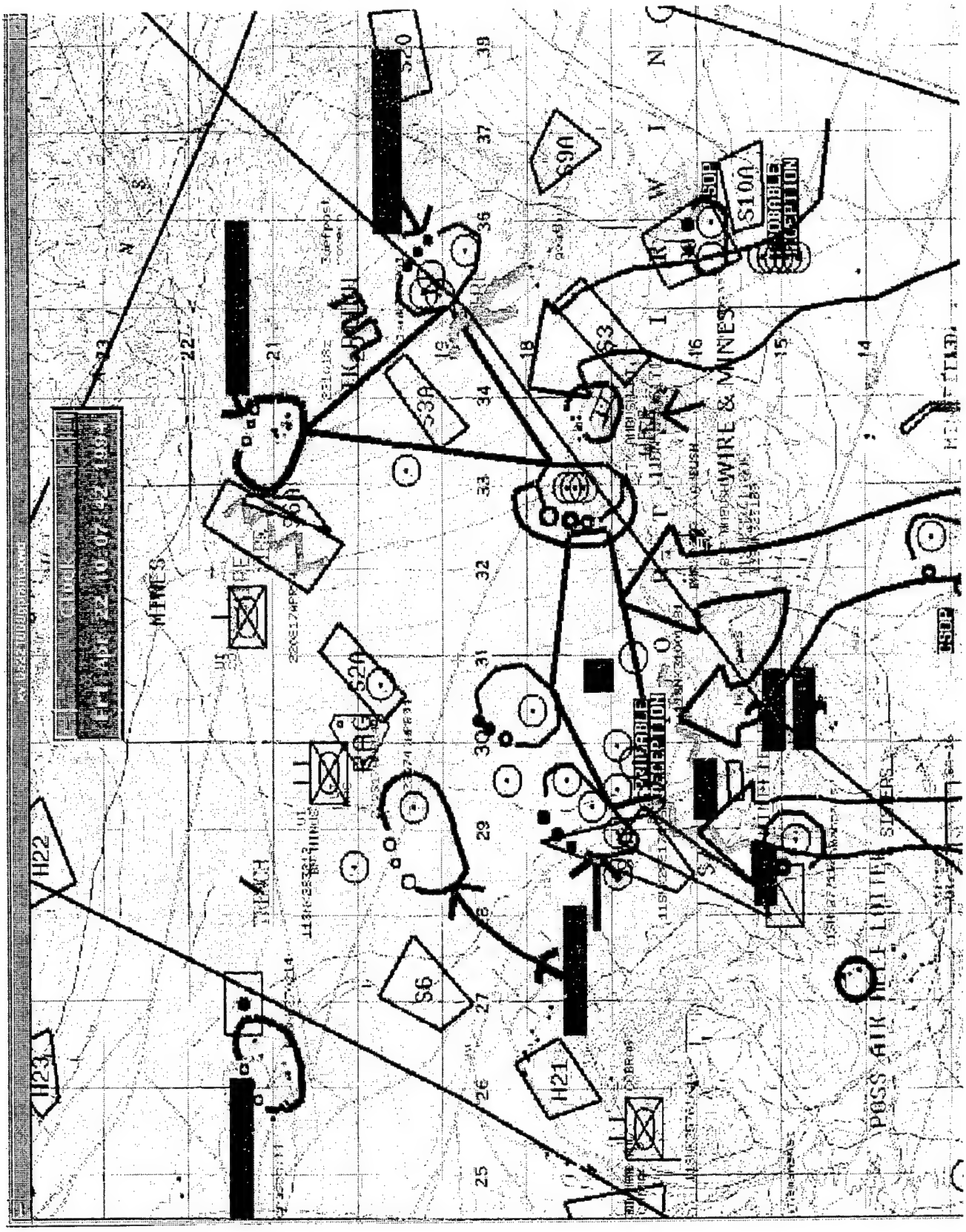
With the improved situational awareness, the multinational units will be better equipped to coordinate and synchronize combat actions with the U.S. forces. Enhanced awareness of the location and activity of adjacent friendly units will reduce possibilities for fratricide among coalition forces. An improved view of the enemy situation will enable the multinational force commander to better focus the efforts of the combat forces. Finally, the coalition partners will be better able to coordinate combat support and combat service support issues through the digitally equipped liaison teams and coordination centers.

There are, however, a number of challenges associated with multinational operations for which digitization does little or nothing. These challenges are in the areas of national goals and objectives, differing doctrine and training, equipment disparities, cultural differences, language differences, and finally teamwork and trust. Strong command influence and effective liaison will still be keys to successful multinational operations as they always have been.

Appendix A: Sample Maneuver Control System (MCS) Display.



Appendix B: All Source Analysis System (ASAS) Display.



Notes

[1] U.S. Army. U.S. Army International Digitization Strategy. Army Digitization Office, (Washington D.C., 1996), p. 2.

[2] Peter G. Tsouras, Warriors' Words, A Quotation Book (London: Arms and Armour Press, 1992), p. 79.

[3] The Joint Staff, Joint Publication 3-16, Joint Doctrine for Multinational Operations (First Draft), (Washington D.C., 1995), p. I-3.

[4] Joint Pub 3-16 p. IV-1.

[5] U.S. Army. Field Manual 100-8, The Army in Multinational Operations, (Draft). (Washington D.C. 199, p. 1-3. However, according to FM 100-5, the Principle of War is actually *Unity of Command*, not *Unity of Effort*. Unity of Effort is an essential complement to Unity of Command.

[6] J.O. Welch, "American Participation in the NATO Multinational Corps: Challenge Organization Interoperability and C2." (Individual Study Project, U.S. Army War College Carlisle Barracks PA, 1992), p. 32

[7] U.S. Army, Force XXI, Land Combat in the 21st Century, (U.S. Army Training and Doctrine Command, Ft. Monroe VA)

[8] Force XXI is the term used to describe the objective army of the twenty-first century. The focus of the program is on leveraging information technology and other technology to create smaller but highly lethal army. The series of Advanced Warfighting Experiments (AWEs), beginning in 1992 have been conducted to test the feasibility and suitability of numerous new technologies and concepts. For more information see the pamphlet published by Army Training and Doctrine Command, Ft. Monroe VA, entitled Force XXI, Land Combat in the 21st Century.

[9] The systems are part of the Army Battle Command System (ABCS) and will be described in detail in chapter IV.

[10] U.S. Army. Army Digitization Master Plan. Army Digitization Office, (Washington D.C., 1996), p.2-12.

[11] U.S. Army, Prairie Warrior '95 Initial Impressions Report, (Joint Venture Combined Arms Assessment Team, Ft. Leavenworth KS, 2 June 1995.), p. 2-11.

[12] Joseph S. Nye Jr. and William A. Owens, "America's Information Edge," Foreign Affairs, March/April 1996, p. 27. Nye and Owens conclude that America's information advantage will provide the key ingredient to enhance the unity of effort in future coalitions.

[13] Throughout the numerous reports, after action reviews, and articles reviewed as part of the research for this monograph, a number of the comments on the benefits gained from the use of digitization, related to the battlefield operating systems of command an control and intelligence.

[14] U.S. Army, FM 100-5 Operations, (Washington D.C., 1993), p. 6-2.

[15]Major J.H. McIntosh, "British Preparation for Coalition Warfare," (British Army Review, April 1995), p. 64.

[16] as quoted in, Major J.H. McIntosh, RAMC "British Preparation for Coalition Warfare," British Army Review 109, (April 1995), p.60.

[17] LTC Mark K. Wells, USAF, "Multinational Command: Lessons from Waterloo," Military Review, (July 1991), p.64-74.

[18] Major J.H. McIntosh, RAMC "British Preparation for Coalition Warfare," British Army Review 109, (April 1995), p. 60.

[19] National Military Strategy of the United States of America, (1995), p.13.

[20] Wells, p.65.

[21] Welch, p. 32.

[22] Ibid., p. 28.

[23] FM 100-8, p. 2-31.

[24] LTC Kevin Arnold and Lieutenant Colonel Nigel Plowright (UK), Members of the Allied Rapid Reaction Corps planning staff, interviewed by author, 13 February 1996, Ft. Leavenworth KS.

[25] LTC Marc Michaelis, "The Importance of Communicating in Coalition Warfare," Military Review, (Nov 1992), p. 41.

[26] U.S. Army, "Doctrine Note, Considerations for Commanders in Multinational Operations," Corps and Division Doctrine Directorate, Combined Arms Center, Ft. Leavenworth KS, 5 July 1995.

[27] Ibid.

[28] Franks, LTG Frederick and MAJ Alan T. Carver, "Building a NATO Corps," Military Review, (July 1991), p.35-36.

[29] LTC Mike Combest, Interviewed by author, 22 April 1996, Ft. Leavenworth KS.

[30] U.S. Army, "Somalia Crisis Collection Group Army Lessons Learned," CAC History Office, (Fort Leavenworth, KS, 3 September 1993), p.133.

[31] R.W. Komer, "Needed: Preparation for Coalition War," RAND Corporation, Santa Monica CA, (1976), p.2.

[33] MG Waldo D. Freeman, et al, "The Challenges of Combined Operations," Military Review, (November 1992), p.3-11.

[34] Ibid. p. 6.

[35] BG William J. Mullen III, and LTC George A. Higgins, "The Four Pillars of Interoperability," Military Review, (January 1992), p.46-53.

[36] FM 100-8, p. 2-26.

[37] FM 100-8, p. 2-27.

[38] The Army has conducted a series of Advanced Warfighting Experiments (AWEs), beginning in 1992 designed to test the feasibility and suitability of numerous new technologies and concepts. For more information see the pamphlet published by Army Training and Doctrine Command, Ft. Monroe VA, entitled Force XXI, Land Combat in the 21st Century.

[39] Mark Hewish, "Battlefield Digitization: When the Talking has to Stop," International Defense Review, (November 1995), p 26.

[40] Army Digitization Master Plan, 1995, p. 1-2.

[41] This figure was obtained from the TRADOC Program Integration Office-Army Battle Command Systems (TPIO-ABCS), it was a part of a briefing entitled "The Evolution of MCS".

[42] Army Digitization Master Plan, 1995, p.2.

[43] Ibid., p.1-2, 1-3.

[44] General Gordon R. Sullivan and Colonel James M. Dubik, as quoted in the U.S. Army. Army Digitization Master Plan. Army Digitization Office, (Washington DC, 1995), p. 1.

[45] Army Digitization Master Plan, p. 2.

[46] Ibid., p. 1-2.

[47] U.S. Army, Memorandum, Commander, Task Force 2-33 Armor, "Final After Action Report (AAR) to Advanced Warfighting Experiment (AWE) Focused Dispatch", 29 September 1995, p.3.

[48] Ibid., p. 3.

[49] U.S. Army, Prairie Warrior '95 Initial Impressions Report, Joint Venture Combined Arms Assessment Team, 2 June 1995. p. vi.

[50] Ibid., p. 2-11.

[51] Personal observation of the author. The author served as plans and operations officer for the heavy brigade of the Mobile Strike Force during Prairie Warrior '95.

[52] Army Digitization Master Plan 1996, section 5.2.

[53] This figure was obtained from the TRADOC Program Integration Office-Army Battle Command Systems (TPIO-ABCS), it was a part of a briefing entitled "The Evolution of MCS".

[54] The Army Digitization Master Plan, 1996, section 5.2.1.

[55] "Final After Action Report (AAR) to Advanced Warfighting Experiment (AWE) Focused Dispatch", p. 3.

[56] In addition to providing the basic situational awareness, the digital systems will provide the commander and staff the ability to access and distribute information throughout the battlefield as necessary. The ADMP identifies some of the specific capabilities of the systems as:

- Automatic position location and reporting.

- Digital map with graphics, and hasty mapping products.
- Graphical display of the location of all members of the unit and adjacent friendlies.
- Display of enemy locations in predetermined zone or sector.
- Fusing of digital terrain data and intelligence data into a graphic portrayal of battlespace and situational awareness.
- Templates for digital reports and requests, with prompts.
- Creating, sending, and receiving text and graphics.
- Automatic receiving, consolidating, and transmission of reports.
- An automated roll-up of logistical requirements.
- Access to all available databases.
- Interface and exchange of information with fire support, combat support, and combat service support automated systems.

[57] The Army Digitization Master Plan, 1996, section 5.2.3.

[58] Ibid., section 5.2.3.

[59] Appendix B is an actual ASAS screen download from NTC rotation 94-07.

[60] U.S. Army, Armor Center, Mounted Warfighting Battlespace Lab Report, "Operation Desert Hammer VI, Final Report". p. Exec Sum-5.

[61] Similar comments are noted by commanders in the reports on both AWE Focused Dispatch, and Prairie Warrior '95.

[62] U.S. Army, Armor Center, Mounted Warfighting Battlespace Lab Report, "Operation Desert Hammer VI, Final Report," p. BOS-Intel-1.

[63] Ibid., p. BOS-Intel-1.

[64] The Army Digitization Master Plan, 1996, section 5.2.2.

[65] Ibid., section 5.2.4.

[66] Ibid., section 5.2.4.

[67] Ibid., section 5.2.5.

[68] This assertion is supported in U.S. Army, Prairie Warrior '95 Initial Impressions Report, Joint Venture Combined Arms Assessment Team, 2 June 1995. p. 2-2.

[69] Peter G. Tsouras, Warriors' Words, A Quotation Book (London: Arms and Armour Press, 1992), p. 79.

[70] Joseph S. Nye Jr. and William A. Owens, "America's Information Edge," Foreign Affairs, (March/April 1996), p. 27.

[71] Yaeger, MAJ Jeffrey, "Coalition Warfare: Surrendering Sovereignty," Military Review, (NOV 92), p. 61.

[72] Nye and Owens, p.20.

[73] Ibid. p. 23.

[74] Ibid. p. 27.

[75] Ibid. p. 28.

[76] LTC William Parry, Chief, Battlefield Synchronization Division, Mounted Battlespace Battle Lab, Ft. Knox KY, Interviewed by author, 13 February 1996.

[77] Ibid.

[78] FM 100-8, p.2-28 to 2-32.

[79] In some cases Mobile Liaison Teams will be available for the commander when the liaison requirement exceeds his capabilities. MLTs are 23 man organizations prepared to deploy to the various regions of the world in support of CINCs operations. They are described in FM 100-8, p. C-1,2.

[80] FM 100-8, p. B-1.

[81] Ibid., p. 2-4, 5.

[82] Ibid., p. 2-29.

[83] Ibid., p. 2-4.

[84] FM 100-5, p. 6-2.

[85] Nye and Owens, p. 27.

[86] Ibid., p. 27.

[87] LTC Joseph E. Orr, Commander, Task Force 2-33 Armor, Memorandum, "Final After Action Report (AAR) to Advanced Warfighting Experiment (AWE) Focused Dispatch", 29 September 1995, Ft. Knox, KY. p. 3.

[88] LTC Mike Combest, Interviewed by author, 22 April 1996, Ft. Leavenworth KS.

[89] Ibid.

[90] U.S. Army, "Doctrine Note, Considerations for Commanders in Multinational Operations", Corps and Division Doctrine Directorate, Combined Arms Center, Ft. Leavenworth KS, 5 July 1995.

[91] Nye and Owens, p.28.

[92] LTC Kevin Arnold and Lieutenant Colonel(UK) Nigel Plowright, Members of the Allied Rapid Reaction Corps planning staff, interviewed by author, 13 February 1996, Ft. Leavenworth KS.

[93] FM 100-8, p. 2-26.

[94] FM 100-5, p. 6-2.

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